

STATE OF NEW JERSEY
Board of Public Utilities
Two Gateway Center
Newark, NJ 07102
www.bpu.state.nj.us

ENERGY

IN THE MATTER OF THE BOARD'S INVESTIGATION)	
INTO ALLEGATIONS OF STRAY VOLTAGE)	ORDER ADOPTING REPORT
OCCURRENCES WITHIN THE SERVICE TERRITORY)	
OF JERSEY CENTRAL POWER & LIGHT COMPANY)	DOCKET NO. EO02120923

(SERVICE LIST ATTACHED)

BY THE BOARD

In July 2002, several customers of Jersey Central Power and Light Company ("JCP&L" or "Company") residing in the Township of Brick, Ocean County, complained to the Board of Public Utilities ("Board") about experiencing tingling sensations when entering their pools, hot tubs, outdoor showers and when touching conductive objects. The Board also received media inquiries regarding these complaints.

The Board's staff ("Board Staff") requested JCP&L to immediately investigate the complaints. As a result of its investigation, the Company determined that the tingling sensations were the result of "stray voltage." Stray voltage is the non-technical term for a phenomenon known as "neutral-to-earth voltage," which is an extraneous voltage that typically appears on grounded surfaces such as wires, pipes and soil, and in buildings and other structures. Stray voltage can result from poor or deteriorating wiring, faulty equipment, or improper grounding. In addition, the normal load current flowing in a distribution system's neutral and ground wires creates stray voltage. In most instances, stray voltage is not a problem because the levels are generally below the point detectible by humans and it usually does not affect electronic equipment.

JCP&L immediately implemented a mitigation program for the distribution circuits in the area of the complaints that included the installation of upgraded neutral distribution wires and additional "down-ground"¹ wires and rods, and the re-crimping of transformer connections to the down-ground wires. Since the complaints originated in the vicinity of the Herbertsville Substation ("Substation"), which serves the distribution circuits in the affected area, the Company also installed additional down-ground wires and performed other mitigation measures at the Substation as well. While the mitigation efforts reduced the stray voltage levels in some areas, the problem was not completely eliminated.

On September 26, 2002, Board Staff requested the assistance of the National Regulatory Research Institute ("NRRI") to investigate the stray voltage phenomenon. The NRRI, affiliated with Ohio State University, is the research arm of the National Association of Regulatory Utility

¹ Down-ground wires are installed on utility poles and other equipment to mitigate the possibility of electric shock.

Commissioners, of which the Board is a member. On October 4, 2002, the NRRI hired VitaTech Engineering, LLC, ("VitaTech" or Consultant") to investigate the stray voltage occurrences and to submit a report containing an assessment, findings and recommendations to mitigate the problem. VitaTech is experienced in matters concerning electrical phenomena of various types. Board Staff supervised the Consultant during all aspects of the investigation and accompanied the Consultant at all meetings and on all inspections related to this investigation.

VitaTech commenced its investigation on October 9, 2002, meeting with JCP&L representatives and reviewing various technical documents relating to the Herbertsville Substation and the surrounding area, including JCP&L's previous mitigation efforts. The investigation included a thorough site survey and recording of neutral-to-earth voltage levels as well as other voltage, current, harmonic and flux density measurements. Upon completion of its investigation, VitaTech submitted its report, entitled "New Jersey Stray Voltage/Ground Current Investigation and Assessment," dated November 4, 2002 ("Report") to the NRRI, which submitted the Report to the Board.

VitaTech noted that the stray voltage phenomenon occurred during a peak summer season when the Herbertsville Substation's transformers, and the distribution circuits served by those transformers, were operating at significantly higher seasonal loads. The Consultant also noted that New Jersey was experiencing a severe drought at the same time of the seasonal peak load conditions.² VitaTech determined that a combination of poor soil conditions and a low water table in the vicinity of the Herbertsville Substation was impeding earth return currents traveling back to the substation from the distribution circuits. The Consultant further determined that the drought conditions existing at that time increased soil resistivity, further exacerbating the stray voltage situation. The Consultant acknowledged JCP&L's earlier mitigation efforts as being "very vigorous" as the magnitude of the stray voltage became more apparent.

Based on its assessment of the situation, VitaTech concluded that, while the distribution system was properly sized for normal operations, the primary neutral wires on the distribution circuits were not sized to accommodate the added impedance resulting from the drought conditions. The Consultant therefore recommended that the neutral wires be upgraded on the affected distribution circuits, and that the loads on the circuits' phases be more evenly balanced. JCP&L reviewed the Report and submitted its comments on December 3, 2002, accepting VitaTech's findings, and agreeing to implement the recommendations.

Discussion and Findings

The Board has reviewed VitaTech's Report and the Company's comments accepting the findings and recommendations contained therein. The Board FINDS the Report to be responsive to the identification and mitigation of the stray voltage phenomenon in the vicinity of the Herbertsville Substation and surrounding area. The Board therefore ADOPTS VitaTech's Report and the recommendations contained therein.

The Board notes JCP&L's prior mitigation efforts as discussed in both the text of the Report and the appendix to the Report entitled "JCP&L's Herbertsville – Neutral-to-Earth (NEV) Investigation." According to the Report, upon receiving the first complaint on July 22, 2002, the Company immediately undertook a number of initiatives to identify the source(s) of the stray

² Governor James E. McGreevey issued Executive Order No. 11 on March 4, 2002 declaring a state of water emergency for the entire State due to unusually dry weather conditions and significantly depleted surface and ground water levels. On January 8, 2003, Governor McGreevey issued Executive Order No. 44, rescinding the state of water emergency as the result of abundant rainfall during the latter part of 2002.

voltage phenomenon and to mitigate the stray voltage levels at the Herbertsville Substation and on two of the four distribution circuits served by the Substation. The Company's investigative actions included contacting providers of cable television, telephone and natural gas services in the area to assist in identifying possible sources. JCP&L also requested and obtained a geological survey by the New Jersey Department of Environmental Protection to determine the composition of the soil and the zone of water saturation through test borings in the affected area. The Company performed some repairs and modifications to its electrical distribution system that reduced stray voltage levels in some areas. VitaTech appears to be supportive of the Company's overall response to the stray voltage situation. These efforts notwithstanding, the Board believes continued mitigation efforts, as recommended by VitaTech and accepted by JCP&L, are necessary to further reduce the potential for stray voltage. The Board therefore DIRECTS JCP&L to implement the recommendations therein to mitigate the potential for future recurrences of stray voltage situations in the vicinity of the Herbertsville Substation and surrounding area.

The Board DIRECTS the Company to complete the implementation effort prior to June 1, 2003, and to advise the Board, in writing, within thirty (30) days of completion. The Company shall provide a detailed description of all remedial activities performed.

DATED: March 6, 2003

BOARD OF PUBLIC UTILITIES
BY:

(SIGNED)

JEANNE M. FOX
PRESIDENT

(SIGNED)

FREDERICK F. BUTLER
COMMISSIONER

(SIGNED)

CAROL J. MURPHY
COMMISSIONER

(SIGNED)

CONNIE O. HUGHES
COMMISSIONER

(SIGNED)

JACK ALTER
COMMISSIONER

ATTEST:

(SIGNED)
KRISTI IZZO
SECRETARY

SERVICE LIST

Nusha Wyner, Esq.
Board of Public Utilities
Two Gateway Center
Newark, NJ 07102

George Riepe
Board of Public Utilities
Two Gateway Center
Newark, NJ 07102

Helene Wallenstein, Esq.
Division of Law
PO Box 45029
Newark, NJ 07101

Seema Singh, Esq.
Division of the Ratepayer Advocate
PO Box 46005
Newark, NJ 07102

Michael Filippone
Jersey Central Power & Light Co
200 Madison Avenue
Morristown, NJ 07962

Michael Obremski
Jersey Central Power & Light Co
200 Madison Avenue
Morristown, NJ 07962